M A R C O

CP-690E AUTOMATIC CHART PROJECTOR

Instruction Manual

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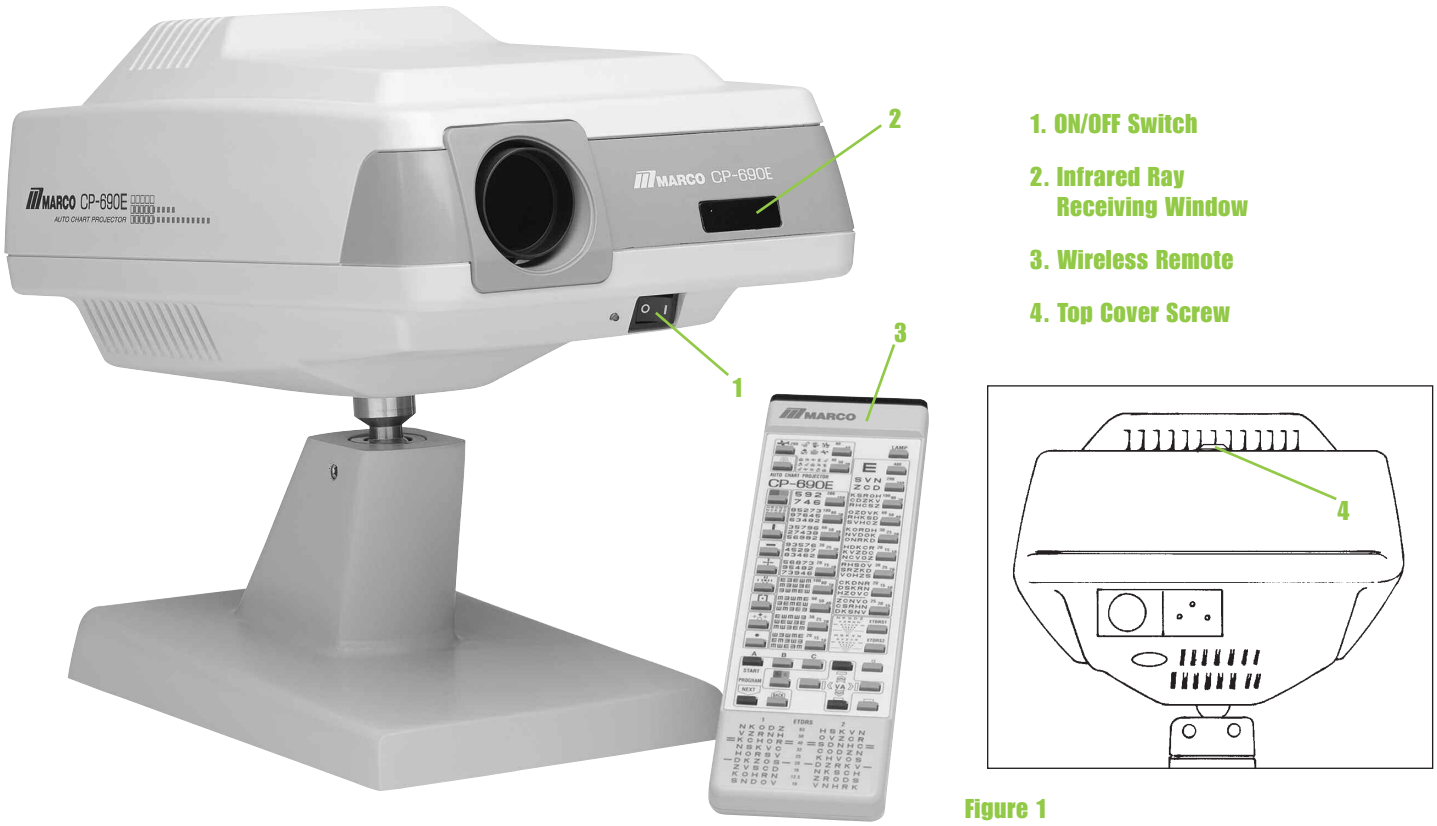
INTRODUCTION

The Marco CP-690E Automatic Chart Projector is a wireless remote controlled unit which provides instantaneous selections of 33 of the most popular ophthalmic charts used. With programmable random access capability, the instrument enables you to quickly and easily program pre-selected slides and present them in a sequence most suited to your particular refraction needs. Superior masking features and red/green filtering over any appropriate chart also extends the capability of the CP-690E. The excellent design in both function and style will increase the efficiency of your examination procedures, provide you with state-of-the-art technology, and enhance the decor of your office.



1. ON/OFF Switch
2. Infrared Ray Receiving Window
3. Wireless Remote
4. Top Cover Screw

Figure 1

GENERAL DESCRIPTION

The CP-690E consists of the main Chart Projector body, wireless remote control, projection screen, test scale, and dust cover. The table, unit, and wall mounts are optional accessories sold separately. Please review the brief descriptions associated with Figure 1 to familiarize yourself with each function.

1. ON/OFF Switch: The green LED next to the main switch will be illuminated when the main switch is turned on.

2. Infrared Ray Receiving Window: Receives the infrared signals from the wireless remote control unit.

3. Wireless Remote Control: The hand-held remote control unit permits total operation of the Chart Projector from anywhere within the examination room. Maximum range is 25 feet from the projector to the screen.

4. Top Cover Screw: The top cover screw allows for removal of the top cover of the Chart Projector for access to the bulb, focusing and letter size adjustment knobs, and the remote control code switches.

INSTALLATION

Mounting the Projector

Available options for mounting the CP-690E are a wall, unit, and table mount. Preferably, the instrument should be mounted at the same height as the patient's eyes. If this is not possible, tilt the instrument slightly so that the projected image on the screen is at the same height as the patient's eyes.

Positioning the Projector

Measure the distance from patient to screen (refracting distance) and mount the Chart Projector within the following projection distance guidelines:

Refracting Distance	Projection Distance
10 feet	10 - 13 feet
13 feet	13 - 17 feet
16.4 feet	16 - 21 feet
20 feet	19 - 25 feet

To obtain a longer refracting distance in smaller rooms, a mirror or system of mirrors should be used (Figure 2). A high quality front surface mirror is recommended to obtain optimal results.

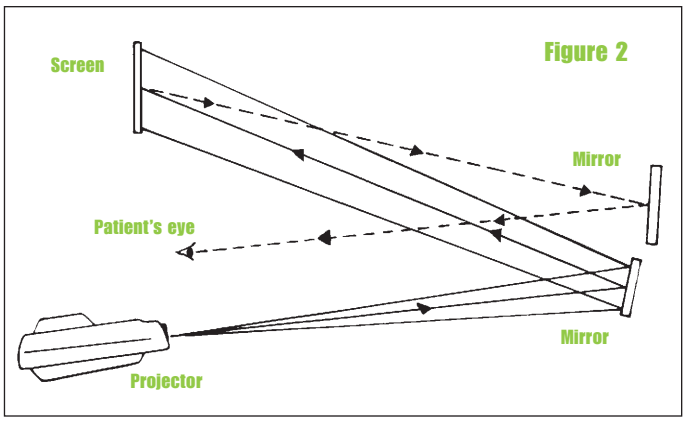


Figure 2

Positioning the Screen (Figure 3)

Hang or hold a small mirror on the screen and tilt or turn the screen until the projected spot of light is properly directed towards the patient.

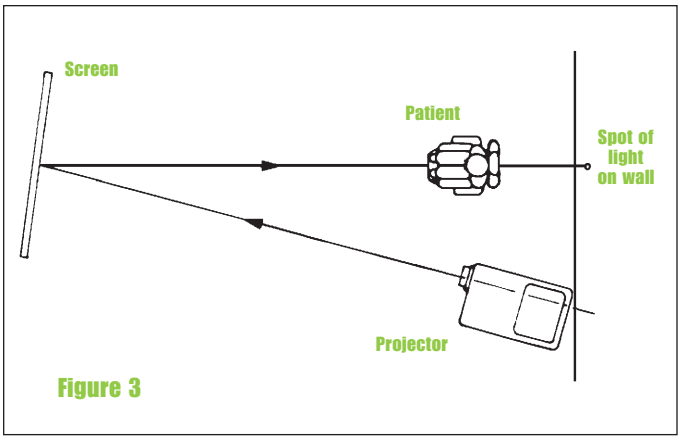


Figure 3

Correct Letter Size and Focus

1. Project the **20/200 N** on the screen.
2. As a reference for proper measurements, have someone hold the distance scale (Figure 4) on the screen and focus the **20/200 N** to measure evenly with the respective distance line. (The scale of 10 to 20 feet refers to the distance from patient to screen.)

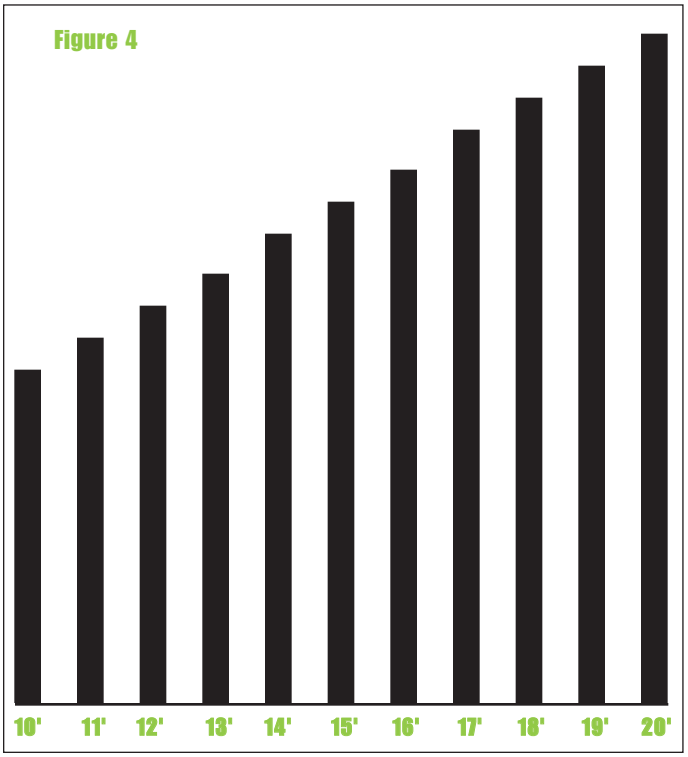


Figure 4

3. To adjust for proper letter size and focus, remove the **top cover** by turning the top cover screw 1/2 turn counterclockwise (refer to figure 5). For image focusing, loosen the focusing knob and slide the focusing tube forward or backward to obtain proper focus. The rear adjustment knob controls letter size. Loosen and slide the knob forward or backward for proper letter size. When adjustments are completed, tighten both knobs and replace the top cover.

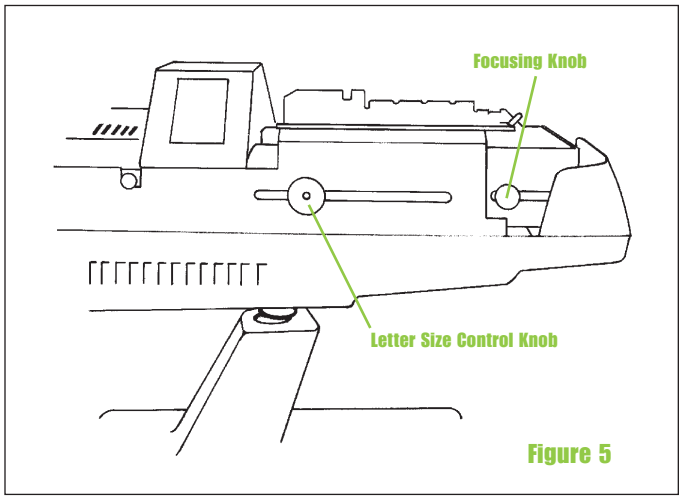


Figure 5

Chart Brightness Adjustment

The brightness level of the projected image can be adjusted in five selectable steps.

1. To adjust the chart brightness level, first remove the top cover by turning the top cover screw counterclockwise 1/2 turn.
2. Turn the small round rheostat switch located on the side circuit board clockwise with a small straight slot screwdriver (please see Figure 6).
3. The brightness level of the projected image can be selected from 1-5 pre-selected steps. Select the level of brightness that best meets the end-users requirements and re-attach the top cover and secure with the top cover screw.

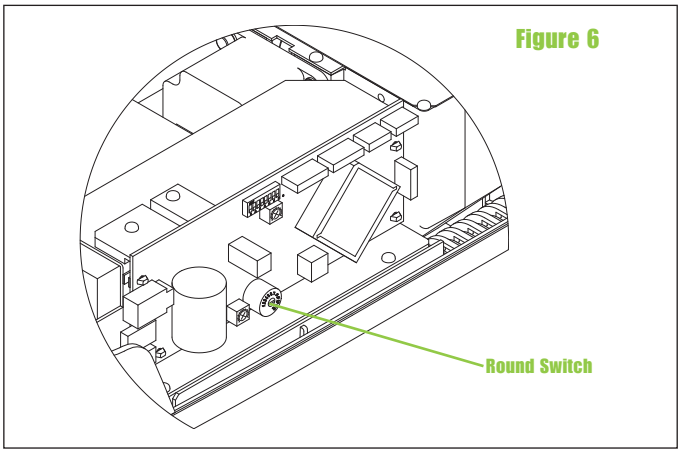


Figure 6

OPERATION

Using the Remote

To effectively operate the CP-690E, it will be important that you understand and familiarize yourself with each function of the remote control unit. It can be easily operated by aiming it directly at the screen or by aiming it at the Chart Projector. Please take plenty of time to accustom yourself to the various selections on the remote control.

The diagram in Figure 7 and the descriptions listed below explain each of the available selections.

"Lamp" On/Off Button

The "**Lamp**" button controls On/Off of the projection lamp from the remote control. When initially depressed, the **20/400E** will automatically be displayed. If the instrument is not operated for more than 15 minutes, a series of warning "beeps" will sound and the instrument will automatically shut off in seven seconds. If a particular chart is needed for more than 15 minutes, depress that chart button again after you hear the warning beeps.

The shut-off timer can be adjusted for a five minute period. Please refer to Figure 9, Setting the Remote Control Code. When switch #6 is turned on, the timer is set for 15 minutes; when #6 is off, the timer is set for five minutes.

Snellen Letter Charts

Eight snellen charts provide selections from 20/400 to 20/10 with five 20/20 lines. Vertical isolations of the 20/20 chart will also display additional 20/20 lines.

Illiterate E Charts

Four illiterate E charts provide selections from 20/100 to 20/15.

Number Charts

Five number charts provide selections from 20/200 to 20/10.

Children's Charts

Three child charts provide selections from 20/100 to 20/20.

Vectograph/Polarized Charts

The CP-690E is supplied with a variety of vectograph or "specialty" charts including a unique Minute Stereo test chart. When a polarized lens is presented to the patient after subjective refinement is completed, the Minute Stereo test chart is viewed by the patient in a 3-dimensional pattern with each symbol "floating" in space beginning with the triangle and following in a clockwise pattern to the circle, star, and then square. A correct response by the patient accurately verifies subjective refinement.

Single Character Masking Button

Depressing the **single character masking button** will totally isolate any single character on any acuity chart. To move the isolation from side to side, depress the vertical masking buttons. To move the isolation up or down to another line on the same chart, depress the horizontal masking buttons.

Movable Vertical/Horizontal Masking Buttons

Depressing the **left vertical masking button** will vertically isolate the far left line on any acuity chart. The **right vertical masking button** will vertically isolate the far right line on any chart. Repeated depressions of these buttons will move the isolation from side to side. Depressing either horizontal masking button will allow you to move the vertical isolation up or down the selected acuity range.

Depressing the **top horizontal masking button** will horizontally isolate the top line of any acuity chart. The **bottom horizontal masking button** will horizontally isolate the bottom line of any acuity chart. Repeated depressions of either button will allow you to move up or down the selected acuity range.

Red/Green Filter Masking Button

In addition to the separate red/green chart provided with the vectograph charts, the CP-690E also gives you the capability of filtering red/green over any appropriate chart with the exception of the 20/400 and 20/300 charts. Filtering is also possible with all illiterate E charts, and all child charts.

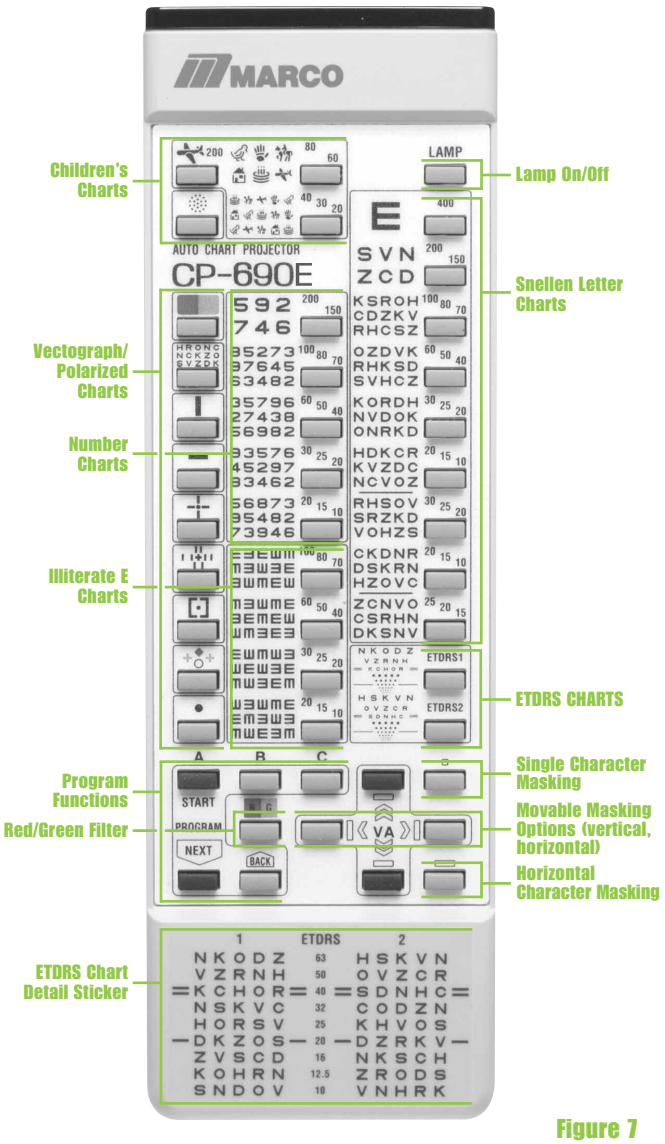


Figure 7

ETDRS Charts

ETDRS is the Early Treatment Diabetic Retinopathy Study that was designed to help patients with diabetes that developed Retinopathy. During this clinical study, the **ETDRS** visual acuity chart and the LogMar system of visual assessment was determined to be the best method for assessing more accurate visual acuities.

On the **ETDRS** acuity chart, the spacing between each letter and each line is directly related to the width and height of the letters, respectively. Each line of letters is a scaled-down version of the line above, meaning the "degree of difficulty" or task for the patient remains the same as the patient reads down the chart. Also, the progression of letter sizes is uniform, increasing in a constant ratio from the bottom to the top of the chart. The results of this visual assessment are usually recorded in terms of a LogMar "score".

Program Functions

The program buttons allow you to pre-program three separate examination sequences. All charts are capable of program storage as well as a "masked" chart selection.

To program and operate a personal selection of charts:

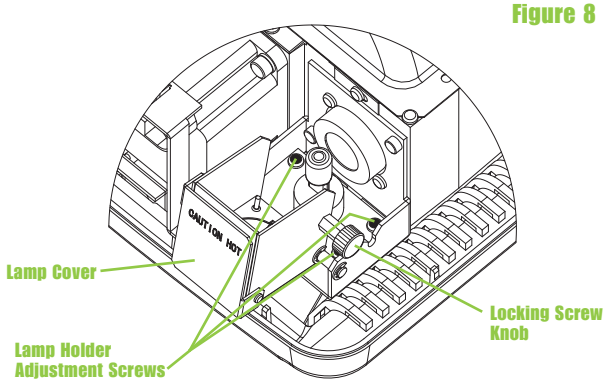
1. Depress the **Lamp Button** on the remote control to turn the unit off.
2. Select the desired program button, **A**, **B**, or **C**, and hold for five seconds. The instrument will "beep" and will immediately display the fixation dot.
3. Select the chart you wish to program immediately followed by the **next** chart. The instrument will "beep", recognizing your selection.
4. After programming is completed, depress the previously selected **program button** (**A**, **B**, or **C**) to store your selections into memory. The instrument will "beep", indicating storage, and will automatically display the **20/400E**. To start your sequence of charts, depress the **START (A) button**. To forward through your program, depress the **NEXT button**. The instrument will "beep" at the end of your program sequence.

CARE AND MAINTENANCE

Changing the Bulb (Figure 8)

1. Turn the **main power switch** off, and unplug the power cord.

Figure 8



2. Remove the top cover by turning the **top cover screw** 1/2 turn counterclockwise.
3. Loosen the small knurled **lamp cover screw**, lift and pull the **lamp cover** back to expose the bulb.
4. Remove the old bulb and replace with an identical bulb.

NOTE: The CP-690E uses a halogen bulb. Please avoid touching the bulb directly with your fingers. This may shorten its life span.

5. Secure the lamp cover, plug the instrument back in, and turn the **main power switch** on.
6. If necessary, adjust the bulb position as needed by turning the **lamp holder adjustment screws**.
7. Replace the **top cover**.

Warning: Replace with Marco 6 volt, 20 watt bulb only. Replacement with any other type bulb will cause major damage and void warranty.

Changing the Fuse

The fuse holder for the CP-690E is also a voltage selector. Do not change the number indicated in the voltage window. The voltage number must match the supplied voltage. Disconnect the power cord from the instrument. The fuse holder is located above the 3-prong power outlet. Pull the fuse holder out while pushing both sides of the fuse holder with two small straight slot screwdrivers. Replace with identical fuses and reinstall the fuse holder.

Changing the Batteries

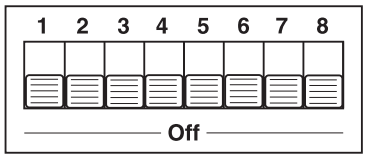
To change the batteries in the remote control, press the tab down located on the back of the remote and pull the latch open. Replace with two fresh AA batteries.

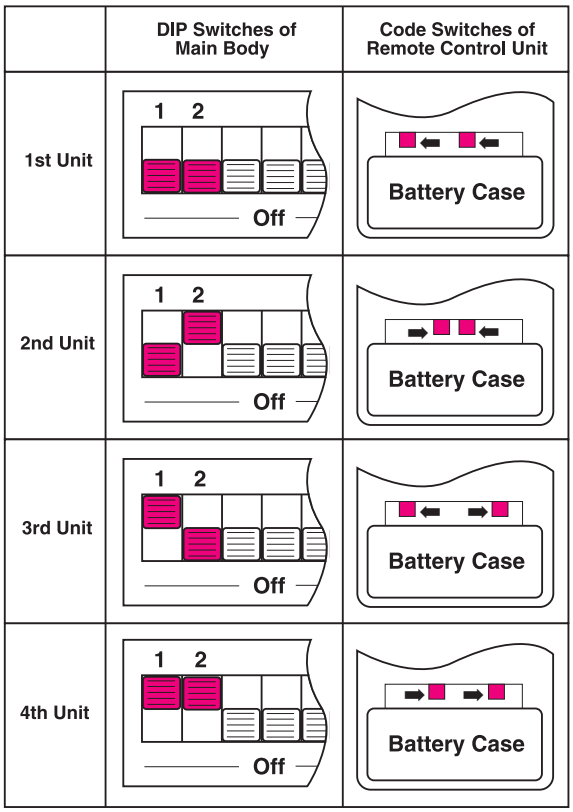
NOTE: When not in use for an extended period of time, please remove the batteries.

SETTING THE REMOTE CONTROL CODE (FIGURE 9)

If more than one Chart Projector is used in the same examination area, the remote control code for each unit should be changed to avoid mis-operation. Four different codes are available.

Figure 9





1. Remove the top cover of the chart projector.
2. Located directly on top of the PC board is a computer chip with eight small switches for the remote control code of the main body. The standard setting from the factory is shown in Figure 9.

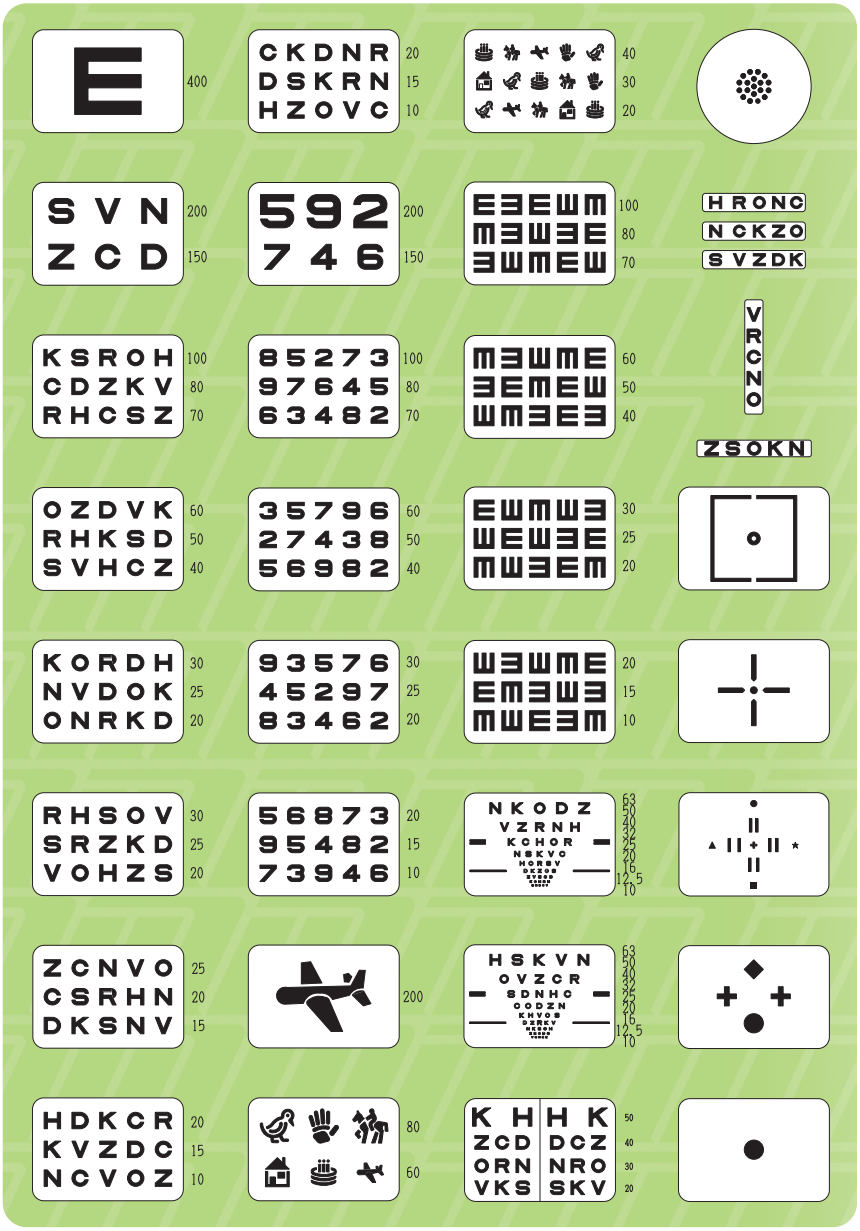
NOTE: Do not change positions of switches 3 through 5.

3. The codes for the remote control are set by the two small "tab" switches located inside the square slot directly above the battery box. Remove the back cover of the remote control to expose these switches.
4. The diagram in Figure 9 illustrates the four different setting codes for the switches of the main body and the code switches for the remote control unit. Please refer to this diagram when setting individual codes for the CP-690E.

SPECIFICATIONS

Chart	33 pcs.
Projection Distance	9.5' to 20' (16.4' is standard)
Projection Magnification	25X (at 16.4')
Projection Size	9.84" x 8.85" and 10.83" diameter
Tilt angle	±10°
Lamp	6V 20W (Halogen), 2,000 hrs. lifetime
Power Source	AC 100, 120, 220 and 240V, 50/60Hz
Power Consumption	50VA
Dimensions	
Main body	11.02"(H) x 8.26"(W) x 13.48"(D)
Control unit	0.70"(H) x 2.51"(W) x 6.88"(D)
Weight	
Main body	15.4 lbs.
Control unit	.98 lbs
Finish	
Main body	White grey
Control unit	White grey
Accessories	1 each of dust cover, screen, test scale, wrench, and 2 spare fuses.
Optional Accessories	Wall mount bracket, desk mount, unit mount.

CHART SAMPLES



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